

DEPARTMENT OF THE INTERIOR, CANADA

Hon. FRANK OLIVER, Minister ; W. W. COX, Deputy Minister

FORESTRY BRANCH—BULLETIN No. 24

R. H. CAMPBELL, Director of Forestry.

WOOD-USING INDUSTRIES, 1910

AGRICULTURAL IMPLEMENTS AND VEHICLES
FURNITURE AND CARS
VENEER

COMPILED BY

H. B. MACMILLAN

ASSISTED BY

BRUCE ROBERTSON AND W. GUY H. BOYCE

OTTAWA

GOVERNMENT PRINTING BUREAU

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LETTER OF TRANSMITTAL

FORESTRY BRANCH,

DEPARTMENT OF THE INTERIOR,

OTTAWA, Sept. 15, 1911.

SIR,—I beg to transmit herewith a report on the wood used in the manufacture of agricultural implements and vehicles and of furniture and cars throughout the Dominion of Canada during the calendar year 1911 and to recommend its publication as Bulletin No. 24 of this Branch.

The bulletin differs from the Forest Products bulletins issued by the Forestry Branch, in that these latter deal with industries that use as their raw material the timber in the log, while the industries just mentioned use as their raw material wood which has already passed through the sawmill.

The bulletin discusses the wood used by these two industries throughout the entire Dominion and also, separately, in the different provinces, also the quantity of wood of each species used, subdividing the total quantities into native Canadian timber and imported timber.

An account of the wood used as veneer is also included in the bulletin, which besides giving the total quantity of wood manufactured or used in Canada for veneer, subdivides this wood into Canadian and imported wood.

I have the honour to be, sir,

Your obedient servant,

R. H. CAMPBELL,

Director of Forestry.

W. W. CORY, C.M.G.,

Deputy Minister of the Interior.

Ottawa.

1.5000

**WOOD USED BY THE MANUFACTURERS OF FURNITURE AND CARS, AGRICULTURAL IMPLEMENTS AND VEHICLES, AND VENEER
IN CANADA, 1910.**

The bulletins on Forest Products published up to the present have been statistics of wood which either passed through the sawmill and was turned out as lumber or was used in its natural state. The following report is compiled and published by the Forestry Branch in an attempt to trace the further manufacture of lumber after it leaves the sawmill by two important classes of manufacturers in Canada. These are the furniture and car industries, and the agricultural implement and vehicle industries. To these has been added the consumption of wood for veneer, which occupies a unique place among the wood industries. This bulletin shows the various species of wood used by these manufacturers, the provinces which contribute these woods and the increased price that is paid for such species above the price at the sawmills. It is expected that a reliable report of this nature will be of assistance to lumbermen, wood-lot owners and manufacturers. Lumbermen should be able to ascertain the industries that use certain species and to judge, consequently, where the best market and highest prices may be procured. To wood-lot owners it will show the species of wood which are in greatest demand and, to a certain extent, will forecast what kind of tree-plantation would be of greatest net profit. Manufacturers can compare the prices paid by them with the average prices, can estimate whether they are buying as economically as possible and by studying the lists of native and imported woods in the different provinces can judge where purchases may be made to the best advantage, or whether the desired species must be imported. A closer acquaintance between buyer and seller should be of mutual benefit.

Furniture and Car Manufacturers.

Furniture and car factories are confined principally to the four provinces listed in the tables. There is a small number of manufacturers in New Brunswick, the prairie provinces and British Columbia who did not report. Reports were received from 119 companies; of these, 81 were established in Ontario, 30 in Quebec, 4 in Nova Scotia and 4 in Prince Edward Island.

In table 1, which follows, is shown, for the whole of Canada and for each province, the total quantity, the total cost and per cent distribution of the lumber purchased by furniture and car manufacturers in 1910; also the total quantity, total cost, and average cost per thousand of the Canadian and imported timbers and the proportion in which each is used.

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TABLE 1.

LUMBER USED BY FURNITURE AND CAR MANUFACTURERS, 1910, BY PROVINCES: Total Quantity, Total Cost and Average Cost of Canadian and Imported Timber.

Province.	TOTAL QUANTITY USED. (Canadian and Imported.)			CANADIAN TIMBER.			
	Quantity.	Cost.	Per Cent Distri- bution.	Quantity.	Cost.	Average Cost per M.	Per Cent Distri- bution.
	M ft. B.M.	\$		M ft. B.M.	\$	\$ cts.	
Canada.....	117,893	2,987,210	100	77,047	1,604,003	20 82	65.4
Ontario.....	62,172	1,740,124	52.7	47,202	1,048,106	22 22	75.9
Quebec.....	38,336	921,679	32.7	24,685	471,201	19 09	64.4
Nova Scotia.....	17,306	323,497	14.6	5,083	82,951	16 32	29.4
P. E. Island.....	79	1,910	*	77	1,685	21 88	97.5
				IMPORTED TIMBER.			
Canada				40,846	1,383,207	33 86	34.6
Ontario.....				14,970	602,018	46 23	24.1
Quebec.....				13,651	450,418	33 00	35.6
Nova Scotia.....				12,223	240,546	19 68	70.6
P. E. Island.....				2	225	112 50	2.5

*Less than tenth of one per cent.

The furniture and car manufacturers of Canada used, in 1910, 177,893,000 board feet of timber, costing \$2,987,210. That the timber used in these industries is of a much higher average quality than the mill run of Canada's saw mills is shown by the fact that it cost \$25.35 per thousand, whereas the average selling price of the lumber produced in Canada in 1910 was only \$15.81.

Much of the timber used in Canada for the manufacture of furniture and cars is imported. In 1910, one third of the total used was imported, chiefly from the United States, at an average cost of \$33.86 per thousand board feet; two thirds was native-grown timber and cost only \$20.82 per thousand board feet. Nothing could more clearly show the general inferiority of the common Canadian timbers for use in manufactures than the fact that Canadian manufacturers are forced to buy fully one third of their supply from a foreign country at a price exceeding, by over sixty per cent, that paid in the home market. It is impossible to secure in Canada, in sufficient quantities, woods which combine beauty with strength so as to be suitable for furnishing high-grade furniture and passenger cars, or which are strong enough for car frames or sidings.

Ontario, the chief manufacturing province of Canada, used over 62,000,000 feet of timber in 1910, worth \$1,740,000. This was over one half of the total used in Canada. One third of the total was used in Quebec and the remaining one sixth was practically all used in Nova Scotia.

Over three fifths of the Canadian-grown timber used in the manufacture of furniture and cars in Canada is used in Ontario. Native hardwoods are more plentiful and varied in Ontario than in any other province, a consideration which is partly responsible for the importance of Ontario in furniture and musical-instrument manufacturing. Aside from Prince Edward Island, where, of the total of 79,000 feet used, 77,000 feet were native-grown, Ontario imports a smaller proportion of wood than any other province. About one-quarter of the wood used in Ontario is imported, as is one third of the wood used in Quebec and seven tenths of the wood used in Nova Scotia.

Because of their more valuable qualities and because of the transportation charges, the imported woods cost much more than the Canadian woods. Canadian manufacturers paid, in 1910, about \$13 per thousand feet more for imported than for native-grown wood; the cost of imported wood was on the average 62 per cent higher than that of native-grown wood.

In Ontario, native-grown wood cost \$22.22; imported wood more than double that price, \$46.23. The difference was not quite as great in Quebec, where native-grown wood cost \$19.09, and imported wood \$33. Timber was cheaper in Nova Scotia than elsewhere in Canada; native-grown wood was only \$16.32 per thousand, and imported wood, chiefly yellow pine for the car shops, was \$19.68.

Table 2 shows the total quantity, total cost, average cost and per cent distribution of the woods used in the furniture and car trades, by origin and species.

TABLE 2.

LUMBER USED BY FURNITURE AND CAR MANUFACTURERS, 1910, BY ORIGIN AND SPECIES:
Total Quantity, Total Cost and Average Cost.

Species.	TOTAL QUANTITY USED. (Canadian and Imported.)			CANADIAN TIMBER.			
	Quantity.	Cost.	Per Cent Distri- bution.	Quantity.	Cost.	Average Cost per M.	Per Cent Distri- bution.
	M ft. B. M.	\$		M ft. B. M.	\$	\$ cts.	
Total	117,893	2,987,210	100	77,047	1,604,003	20 82	65.3
Yellow Pine.....	21,393	542,260	18.2				
Oak.....	16,037	681,442	13.7				
Maple.....	15,141	328,109	12.9	557	38,487	69 10	3.4
Birch.....	15,067	289,991	12.9	15,079	326, 39	21 64	99.6
Spruce.....	9,827	169,842	8.4	15,041	288,999	19 21	99.9
Pine*.....	9,812	199, 61	8.3	9,827	169,842	7 28	100
Basswood.....	7,416	171,120	6.3	9,812	199,961	20 38	100
Elm.....	7,057	161,629	6.0	7,416	171,120	23 07	100
Ash.....	3,468	89,349	3.0	7,044	161,235	22 89	99.8
Beech.....	2,784	52,461	2.4	3,241	75,062	23 16	93.5
Douglas Fir.....	2,532	69,570	2.2	2,784	52,461	18 84	100
Hemlock.....	2,354	29,205	2.1	2,532	69,670	27 48	100
Chestnut.....	940	21,846	0.8	2,354	29,205	12 40	100
Gum.....	826	21,877	0.7				
Tulip.....	808	33,879	0.7				
Mahogany.....	684	83,772	0.6				
Black Cherry.....	313	11,579	0.3				
Poplar.....	312	3,899	0.3				
Black Walnut.....	61	3,501	0.1	312	3,899	12 50	100
Tamarack or Larch.....	50	675	†	19	1,349	71 00	31.1
Circassian Walnut.....	13	2,888	†	50	675	13 50	100
Teak.....	13	2,324	†				
Butternut.....	6	102	†				
Cottonwood.....	5	92	†	6	102	17 00	100
Spanish Cedar.....	1	140	†				
				IMPORTED TIMBER.			
Total.....				40,846	1,383,207	33 86	34.7
Yellow Pine.....				21,393	542,260	25 35	100
Oak.....				15,480	642,955	41 56	96.6
Maple.....				62	1,770	28 55	0.4
Birch.....				26	992	38 15	0.1
Spruce.....							
Pine*.....							
Basswood.....							
Elm.....							
Ash.....				11	394	30 31	0.2
Beech.....				227	14,287	62 74	6.5
Douglas Fir.....							
Hemlock.....							
Chestnut.....							
Gum.....				940	21,846	23 24	100
Tulip.....				826	21,877	26 48	100
Mahogany.....				808	33,879	41 93	100
Black Cherry.....				684	83,772	122 47	100
Poplar.....				313	11,579	37 00	100
Black Walnut.....							
Tamarack or Larch.....				42	2,152	51 24	68.9
Circassian Walnut.....							
Teak.....				13	2,888	222 22	100
Butternut.....				13	2,324	178 00	100
Cottonwood.....							
Spanish Cedar.....				5	92	18 40	100
				1	140	140 00	100

*Includes white and red pine.

†Less than one-tenth of one per cent.

Twenty-five species are used, thirteen of which are native-grown and twelve of which are entirely or chiefly imported.

Four species, namely, yellow pine, oak, maple and birch, together form nearly three fifths of the total and are used in quantities exceeding 15,000,000 feet each per year. Eight species—viz., spruce pine, basswood, elm, ash, beech, Douglas fir and hemlock—constitute nearly all of the remaining two-fifths, and are used in quantities varying from 2,000,000 to 10,000,000 feet each per year. Thirteen other species, viz., Chestnut, gum, tulip, mahogany, cherry, poplar, black walnut, tamarack, Circassian walnut, teak, butternut, cottonwood, and Spanish cedar—together form less than four per cent of the total and are used in quantities varying from 1,000 to 1,000,000 feet per year.

The species which are native-grown are maple, birch, spruce, pine, basswood, elm, ash, beech, Douglas fir, hemlock, poplar, tamarack and butternut. The species which are imported are yellow pine, oak, chestnut, gum, tulip, mahogany, cherry, black walnut, Circassian walnut, teak, cotton and Spanish cedar.

The two most important woods used in the furniture and car factories of Canada are woods imported from the United States, yellow pine and oak.

Yellow pine constitutes nearly one fifth of the wood used in these industries in Canada. Under the names of yellow pine, hard pine, Georgia pine, North Carolina pine, southern pine, pitch pine, longleaf pine, or shortleaf pine, it is imported from the southern United States in large quantities for cheap furniture and freight car ceilings and sidings, uses for which it is rendered suitable by strength, hardness, durability and ability to take a bright finish. Over 21,000,000 feet of yellow pine were imported for these purposes in 1910, at a cost of \$542,000. Yellow pine cost only \$25.35 per thousand feet. It was thus the cheapest of the widely-used imported woods of which it formed over one half the total quantity. Douglas fir is the only Canadian wood which could be used as a substitute for yellow pine.

Oak, together with yellow pine, formed nearly one third of all the woods used in the furniture and car industry of Canada. As is the case with the yellow pine, practically all the oak is imported. Over 16,000,000 feet of oak were used in 1910; about 15,500,000 feet were imported. The average price of the native-grown oak was \$69.10, that of the imported was \$41.56. Oak was at one time fairly abundant in the agricultural districts of Ontario and Quebec; the land has nearly all been cleared and only a small quantity can now be secured each year. The higher average price of the Canadian oak is due to the fact that it comes to the market in small lots and is consequently governed in price by local considerations only. Oak, because of its strength, beautiful grain and fine finishing qualities, is used in different grades for finishing both cheap and expensive furniture, for office fittings, for cores for expensive veneer, for car frames and to a limited extent for inside finish in passenger coaches and trolley cars. Practically all the oak used in Canada comes from the region south of the Missouri and West Virginia. Oak and yellow pine together form nine tenths of the timber imported into Canada for the manufacture of furniture and cars. Birch and maple are the only two Canadian species which can be substituted for oak. They lack the beauty of grain and finishing qualities which render oak so acceptable for furniture and car interiors.

Maple is the most important native-grown wood used by furniture and car manufacturers. Over 15,000,000 feet of maple, costing \$21.64 per thousand, were used in 1910; practically all of this was secured in Canada. Maple is used for cheap furniture, beds, chairs, turned work, trolley and freight car frames. It is also stained to imitate quarter-cut oak and made into very fair-looking medium-priced furniture. Small quantities of bird's-eye maple are used for the finishing of expensive furniture and car interiors.

Birch and maple form over one quarter of the wood used for furniture and cars in Canada. These two woods are used in nearly equal quantities. Over 15,000,000

feet of birch were used in 1910, at an average cost of \$19.21 per thousand, \$2.43 cheaper than maple. Practically all the birch used in the trades is native-grown yellow birch. Birch is used in much the same way as maple for cheap furniture, such as hotel and school supplies, and for interior work in better-class furniture is stencilled and stained to imitate quarter-cut oak. The heartwood of yellow birch is a good furniture wood and is stained to represent cherry and mahogany.

Spruce, on account of its abundance, cheapness, ability to hold its place, fine even grain and freedom from warping or splitting is becoming yearly more important in the furniture and car trade of Canada. Nearly 10,000,000 feet were used in 1910, all native-grown, at an average cost of \$17.28 per thousand. Spruce is used for inside work as a backing for veneers in furniture and musical instruments, for drawers, cheap tables and for freight-car ceilings and sidings.

Pine, including red and white pine, but chiefly the latter, was used to nearly the same extent as spruce and for the same purposes. All the pine used was native-grown and cost \$20.38 per thousand.

Nearly 7,500,000 feet of basswood were used in furniture and cars in 1910. This wood was all native-grown and cost \$23.07 per thousand. Basswood is tough, fine and even in grain, and free from any tendency to warp or split. It is used chiefly in the furniture trade for drawers, shelves, as a backing for veneers, for turned wood and scrolls, for kitchen furniture and cheap tables.

Elm is a comparatively abundant hardwood which has come prominently into use in Canada. Over 7,000,000 feet were used for furniture and cars in 1910 at an average cost of \$22.89. Practically all of this was native-grown wood. Elm is tough, hard and strong; it is used chiefly out of sight in cheap and medium-class furniture such as for dresser-frames, mattress-frames, in wooden beds; it is also stained and varnished to imitate more expensive woods. Elm is frequently given a natural finish in such articles as refrigerators and cheap chairs and tables.

Almost 3,500,000 feet of ash are used each year for furniture and cars. Fifteen-sixteenths of this is native-grown, costing \$23.16 per thousand, and one sixteenth is imported at \$62.74 per thousand. Ash is used in its natural finish for cheap and medium priced furniture and as a backing upon which to veneer more expensive woods. It is also used for office furniture and for the interior finish of trolley cars. The supply of first-class ash is very small in Canada.

Beech is a wood which is used indiscriminately with maple and birch in the manufacture of low-priced house, camp, farm and school furniture. It is used out of sight in medium-priced furniture and to a small extent as a backing for veneers. It is a hard, fairly strong wood which polishes smoothly but it lacks a pretty grain. It was the cheapest hardwood used to any extent in Canada in 1910, costing only \$18.84 per thousand for the 2,784,000 feet used.

Douglas fir is a wood which will grow in importance as a source of supply for furniture and car manufacture. This species was eleventh in importance in 1910; about 2,500,000 feet were used, at an average cost of \$27.48 per thousand. It has been noted that imported yellow pine, chiefly longleaf pine, is the most important wood used in the car and furniture trades. Douglas fir is the only Canadian wood existing in any quantity, the natural qualities of which are such as would enable it to displace yellow pine for car and furniture building. Investigations concerning the properties of these two woods conducted by the United States Forest Service are tabulated here.

TABLE 3.

YELLOW PINE VS. DOUGLAS FIR.—Comparison of Mechanical and Physical Properties.

Properties.	Yellow Pine. (longleaf).	Douglas Fir.
Oven dry weight per cubic foot	36	29
Bending—		
Fibre stress at elastic limit (lbs. per square inch)	3,800	4,000
Modulus of rupture (lbs. per square inch).....	7,200	6,325
Modulus of elasticity (1,000 lbs. per square inch).....	1,560	1,510
Compression—		
Parallel to grain, crushing strength at maximum load (lbs. per square inch).....	4,800	3,500
Perpendicular to grain, compressive strength at elastic limit (lbs. per square inch).....	570	570
	Yellow Pine.	Douglas Fir.
Character of grain.....	Fine and even, annual rings quite narrow with an average of 12 to 20 rings per inch.	Includes red and yellow fir; red fir has a coarser grain than yellow and contains considerable dark coloured summer wood with an average of 9 rings per inch. Yellow fir is a soft, fine-grained wood with an average of 14 rings per inch.
Colour.....	Even; dark reddish yellow to red-dish brown.	Variable; decided reddish tinge to a light yellow.

It is shown above that, in addition to the physical qualities which render Douglas fir as easily worked, as readily polished and as suitable for finish as yellow pine, Douglas fir possesses the mechanical qualities which render yellow pine adaptable for car building and for use in situations where durability, strength and resistance to compression are required.

Douglas fir is about 20 per cent lighter than longleaf pine. This lighter weight is an advantage in the handling of Douglas fir.

Tests made of the comparative strength of longleaf pine and Douglas fir show that Douglas fir is but slightly inferior to longleaf pine. Bending tests show that Douglas fir will support a greater weight without taking a permanent set than will longleaf pine, and that Douglas fir will support almost as great a weight as yellow pine before breaking.

Douglas fir is not so stiff as longleaf pine and will not support so great a pressure parallel to the grain. It will, however, support without crushing just about the same pressure perpendicular to the grain.

On the Pacific coast, Douglas fir is rapidly coming into favour for furniture-making and car-building.

Douglas fir is easily worked and when well seasoned is free from warping or checking. It takes a high polish and is very suitable for all cheaper grades of furniture, such as bedroom sets, tables, kitchen cabinets, chairs, school, lodge and church furniture. It may be stained to represent other woods and may be stamped to imitate quarter-cut oak. Its straightness of grain and the contrast between spring and summer wood render it very suitable for mission furniture.

Douglas fir is a splendid wood for car building, the use for which the greater part of the 21,000,000 feet of yellow pine was imported. It is strong, hard, stiff,

large and clear enough for car frames, is suitable for car sidings and ceilings and is beautiful enough for the interior finish of passenger coaches. It has been used for the interior finish of private cars in the United States.

The hemlock used in these industries is all Eastern hemlock. Nearly 2,500,000 feet, all native-grown, were used in 1910 at an average cost of \$12.40 per thousand. Because of its low technical qualities hemlock is the cheapest wood used in Canada for these purposes. It is used in limited quantities in the cheapest, roughest furniture. Its chief use is in freight cars.

The chestnut used in Canada is all imported for the furniture trade. 940,000 feet were used in 1910 at a cost of \$23.24 per thousand. Wormy chestnut is used as a backing for veneer in musical instruments, coffins and furniture. Sound chestnut in its natural finish is used for medium-priced furniture.

The gum used in Canada is all black gum from the Mississippi valley. Over 800,000 feet were used in 1910 at \$26.48 per thousand. It is a hard, tough wood, difficult to season, which takes a fair finish. It is used for cheap and medium-priced furniture, as a backing for veneer, and in its natural finish is stained to imitate other woods in panels. Gum manufacturers are organized to find a market and the use of it will increase in Canada.

Though tulip is a native of Southern Ontario all the tulip used for furniture in Canada is imported. Over 800,000 feet were imported from the Appalachian and Mississippi states in 1910 at a cost of \$41.93 per thousand. Tulip is a tough, even-grained wood which is easily worked and remarkably free from checking or warping. It is used in furniture for panel work, shelves, partitions, drawers and veneer backing.

All the mahogany used in Canada comes from tropical Africa and America through the Liverpool and New York markets. It is an ornamental wood used solid and as veneer in the manufacture of high-class house, office and hotel furniture and in the interior finish of passenger coaches.

Black cherry is native to Canada, but is almost extinct commercially and all the cherry used for furniture in Canada is imported from the United States. Over 300,000 feet of black cherry were imported from the United States for furniture and cars in 1910, at an average cost of \$37 per thousand. Only 75,000 feet were cut in Canada in 1910. Cherry is a beautiful finishing wood and is used principally in the form of veneer for musical instruments and expensive furniture. Small quantities are used for the interior finish of passenger coaches.

Poplar is one of the cheapest woods used in Canada. Over 300,000 feet were used for furniture in 1910 at \$12.50 per thousand. Poplar is a soft, tough, white, even-grained wood of medium strength and of a fair degree of freedom from warping or splitting. It is used for very plain, cheap furniture and for drawers, shelves, veneer-backing, and inside work in furniture. It is abundant in Canada and should displace the more expensive basswood and tulip.

Black walnut is, though native to Canada, almost commercially extinct. It was once a very popular furniture wood but has fallen from favour. It is a wood of great beauty, but not showy, and possesses every valuable technical quality. Black walnut is now used to a limited extent for expensive furniture. Only about 61,000 feet of black walnut were used for furniture in 1910, one-third native-grown, costing \$71 per thousand, and two-thirds imported from the United States at \$51.24 per thousand.

Tamarack is a hard, strong wood which is not used to the extent which its qualities warrant. It takes a fair polish and is suitable for cheap furniture. It is chiefly used for this purpose and to a small extent in the building of freight cars. All the tamarack used is produced in Canada. 50,000 feet were used in 1910, costing \$13.50 per thousand.

Circassian walnut is an even-grained, showy wood, taking a high polish. It is chiefly imported in the veneer for finishing expensive household furniture. A small

quantity, 13,000 feet, was imported in 1910 for the manufacture of solid furniture at a cost of \$222.22 per thousand feet. Circassian walnut is imported from Europe and is the most expensive furniture wood used in Canada.

Teak is a high-grade tropical wood used to a limited extent in Canada. It is one of the best of furniture woods; in its qualities it resembles black walnut. About 13,000 feet of teak were imported from India in 1910 at a cost of \$178 per thousand.

The three remaining woods, namely, butternut, cottonwood and Spanish cedar, are rarely used in the furniture or car industry.

Table 4 shows the quantity, total value and average value of the timber used for furniture and car building in Ontario, by species and origin, together with the per cent each species forms of the total and the proportion of each species produced in Canada and imported.

TABLE 4.

LUMBER USED BY FURNITURE AND CAR MANUFACTURERS, 1910, IN PROVINCE OF ONTARIO,
BY ORIGIN AND SPECIES: Total Quantity, Total Cost and Average Cost.

Species.	TOTAL QUANTITY USED. (Canadian and Imported.)			CANADIAN TIMBER.			
	Quantity.	Cost.	Per Cent Distri- bution.	Quantity.	Cost.	Average Cost per M.	Per Cent Distri- bution.
	M ft. B. M.	\$		M ft. B. M.	\$	\$ cts.	
Total...	62,172	1,740,124	100	47,202	1,018,106	22 20	75.1
Maple...	13,265	294,348	21.4	13,203	292,578	22 10	99.6
Oak.....	10,895	536,173	17.6	433	35,362	81 07	3.9
Elm.....	6,413	148,520	10.3	6,400	148,126	23 14	99.8
Basswood...	5,880	136,805	9.5	5,880	136,805	23 27	100
Birch.....	4,610	114,458	7.4	4,584	113,466	24 79	99.5
Pine*.....	4,565	86,373	7.3	4,565	86,373	18 95	100
Spruce.....	3,132	50,306	5.2	3,132	50,306	16 07	100
Ash.....	2,421	61,262	3.9	2,376	57,662	27 30	98.2
Beech.....	2,304	47,061	3.7	2,304	47,061	20 44	100
Hemlock...	2,091	25,262	3.7	2,091	25,262	12 08	100
Douglas Fir.....	1,528	42,600	2.4	1,528	42,600	27 93	100
Yellow Pine...	1,436	48,000	2.3				
Chestnut...	923	20,994	1.5				
Gum.....	826	21,877	1.3				
Mahogany...	512	62,186	0.8				
Tulip.....	498	18,727	0.8				
Black Cherry...	94	5,191	0.2				
Black Walnut...	60	3,381	0.1	19	1,349	71 00	21.7
Circassian Walnut.	13	2,888	†				
Teak.....	13	2,324	†				
Poplar.....	12	217	†	12	217	18 00	100
Butternut.....	6	102	†	6	102	17 00	100
Cottonwood...	5	92	†				
Spanish Cedar.	1	140	†				
				IMPORTED TIMBER.			
Total.....				14,970	692,018	46 23	24.9
Maple.....				62	1,770	28 55	0.4
Oak.....				10,462	500,811	47 87	98.1
Elm.....				13	394	30 30	0.2
Basswood...				26	992	38 15	0.5
Birch.....							
Pine*.....							
Spruce.....				45	3,600	80 00	1.8
Ash.....							
Beech.....							
Hemlock...							
Douglas Fir.....							
Yellow Pine...				1,436	48,000	33 52	100
Chestnut...				923	20,994	22 75	100
Gum.....				826	21,877	26 49	100
Mahogany...				512	62,186	121 45	100
Tulip.....				498	18,727	37 65	100
Black Cherry...				94	5,191	55 22	100
Black Walnut...				41	2,032	49 56	78.3
Circassian Walnut.				13	2,888	222 22	100
Teak.....				13	2,324	178 77	100
Poplar.....							
Butternut.....							
Cottonwood...				5	92	18 40	100
Spanish Cedar..				1	140	140 00	100

*Includes white and red pine.

†Less than one-tenth of one per cent.

Ontario manufacturers use more species of wood than the manufacturers of any other province. They use all the species used in Canada excepting tamarack. They use all, or practically all, of the maple, elm, beech, hemlock, chestnut, gum, mahogany, black walnut, Circassian walnut, teak, butternut, cottonwood and Spanish cedar used in Canada; they use also the greater part of the oak, basswood, ash, Douglas fir and tulip. Three-quarters of the wood used in Ontario is native-grown.

Ontario does but a small proportion of the car building of Canada, and in consequence the woods used in Ontario are chiefly the woods used for furniture. The car woods used in Ontario are chiefly the woods used for electric cars.

The above table shows that maple is the most important wood in Ontario, forming 21.4 per cent of the total. Ontario maple forms 87.7 per cent of all the maple used in Canada; 13,265,000 feet were used in 1910 in Ontario and cost \$294,348, or \$22.19 per thousand. The 62,000 feet imported consisted principally of Michigan hard maple at \$28.55 per thousand, used for rattan work.

Oak was used to the extent of 10,895,000 feet, or 17.6 per cent of the total, 96 per cent of which was imported, at a cost of \$47.87 per thousand. This is over 67 per cent of the oak imported into Canada. Ontario also supplied 433,000 feet of native oak at the high figure of \$81.97 per thousand. This is 77.7 per cent of the total of Canadian oak.

Elm stands third on the list and 99.8 per cent of its 6,413,000 feet was Canadian wood at an average value of \$23.14 per thousand. Ontario supplied 90 per cent of the total elm used in Canada.

Basswood was used to the extent of 5,880,000 feet and was all native wood. It was worth \$23.27 per thousand. A great proportion of basswood used was consumed in piano and organ works.

Ontario supplied 83 per cent of all the beech used in Canada at an average of \$20.44 per thousand. This is \$5.44 per thousand more than was paid for beech in Quebec.

2,091,000 feet of hemlock were used at a cost of \$12.08 per thousand. This is over 88 per cent of the total amount used in Canada.

All the chestnut used in Ontario, which was 98 per cent of the amount used in Canada, was imported, to the extent of 923,000 feet at an average cost of \$22.75 per thousand. It is principally used in the manufacture of moderate-priced caskets.

All the gum used in Canada was imported into Ontario. The 826,000 feet used cost \$26.49 per thousand. Gum is used as a furniture wood, for its natural colour is attractive and it takes a high polish.

Small quantities of Circassian walnut, teak, butternut, cottonwood and Spanish cedar were imported and all used in Ontario.

Table 5 shows the quantity, total value and average value of the wood used in 1910 in the furniture and car industries of Quebec, by species and origin, together with the proportion each species forms of the total and the proportion of each species produced in Canada or imported.

TABLE 5.

LUMBER USED BY FURNITURE AND CAR MANUFACTURERS, 1910, IN PROVINCE OF QUEBEC,
BY ORIGIN AND SPECIES: Total Quantity, Total Cost and Average Cost.

Species.	TOTAL QUANTITY USED. (Canadian and Imported.)			CANADIAN TIMBER.			
	Quantity.	Cost.	Per Cent Distribu- tion.	Quantity.	Cost.	Average Cost per M.	Per Cent Distribu- tion.
	M ft. B. M.	\$		M ft. B. M.	\$	\$ cts.	
Total	38,336	921,679	100	24,085	471,261	19 13	64.4
Yellow Pine...	10,065	308,260	26.4				
Birch.....	9,201	161,619	24.3	9,201	161,619	17 56	100
Spruce.....	5,524	103,901	14.2	5,524	103,901	18 61	100
Pine*.....	4,430	98,546	11.6	4,430	98,546	22 25	100
Oak.....	2,782	93,298	7.3	23	525	22 82	0.8
Maple.....	1,573	31,001	4.1	1,573	31,001	19 11	100
Basswood.....	1,361	27,715	3.7	1,361	27,715	20 37	100
Ash.....	1,044	27,957	2.8	864	17,370	20 14	82.7
Elm.....	600	11,800	1.6	600	11,800	18 36	100
Tulip.....	270	13,152	0.7				
Hemlock.....	258	3,868	0.7	258	3,868	15 00	100
Black Cherry.....	212	5,688	0.6				
Poplar.....	212	2,382	0.6	212	2,382	11 60	100
Beech.....	180	2,700	0.5	180	2,700	15 0	100
Mahogany.....	152	19,086	0.4				
Douglas Fir.....	100	4,400	0.3	100	4,400	44 00	100
Tamarack or Larch.....	50	675	0.1	50	675	13 50	100
Chestnut.....	12	752					
Walnut.....	1	120					
				IMPORTED TIMBER.			
Total				13,551	450,418	32 93	35.6
Yellow Pine...				10,065	308,260	30 63	100
Birch.....							
Spruce.....							
Pine*.....							
Oak.....				2,759	92,773	34 00	99.2
Maple.....							
Basswood.....							
Ash.....				180	10,587	58 82	17.3
Elm.....							
Tulip.....				270	13,152	48 71	100
Hemlock.....							
Black Cherry.....				212	5,688	26 84	100
Poplar.....							
Beech.....							
Mahogany.....				152	19,086	125 53	100
Douglas Fir.....							
Tamarack or Larch.....							
Chestnut.....				12	752	62 66	100
Walnut.....				1	120	120 00	100

*Includes white and red pine.

†Less than one-tenth of one per cent.

Nineteen species of wood were used in Quebec. The entire quantity of tamarack used in Canada for the manufacture of furniture and cars was used in Quebec; the species of which Quebec used the greater proportion were yellow pine, birch, spruce, black cherry and poplar. Two thirds of the woods used in Quebec were Canadian-grown, one third imported. The large proportion of imported wood was due to the great use of yellow pine by the extensive car works of the province.

Yellow pine, of which Ontario used very little, is the most important species in Quebec, forming 26.4 per cent of the total consumption. The 10,065,000 feet used was all imported at an average cost of \$30.63 per thousand. It is used principally by car works for sills, ceiling and siding.

Birch, with 9,201,000 feet, stands second in importance, and this province used 61 per cent of the total amount used in Canada. The Quebec consumption was all native and cost on the average \$17.56. This is \$7.23 per thousand less than Ontario birch.

Spruce was also extensively used. None was imported and the 5,524,000 feet of native wood cost on the average \$18.81 per thousand. This is \$2.74 per thousand more than Ontario spruce.

The above four species (yellow pine, birch, spruce and pine) constitute 76.5 per cent of the total Quebec consumption.

Oak, which stands second in importance in Ontario, is fifth in Quebec. 2,782,000 feet were used, of which 2,759,000 feet were imported at a cost of \$34 per thousand. This is \$13.87 less than the cost of the oak imported into Ontario.

Maple, heading the list in Ontario, stands sixth in Quebec. 1,573,000 feet of native wood were used at a cost of \$19.11 per thousand. This is \$3.08 per thousand less than in Ontario.

Cherry was imported into Quebec to the extent of 212,000 feet at a cost of \$26.84 per thousand. This amount is 67 per cent of the total Canadian consumption.

Sixty-seven per cent of the poplar used in Canada was used in Quebec. The 212,000 feet was all native wood and cost on the average \$11 per thousand. Ontario used only 12,000 feet of poplar and it cost \$18 per thousand.

Table 6 shows the quantity, total value and average value of the wood used in 1910 for furniture and car building in Nova Scotia, by species and origin, together with the proportion each species forms of the total and the proportion of each species produced in Canada or imported.

TABLE 6.

LUMBER USED BY FURNITURE AND CAR MANUFACTURERS, 1910, IN PROVINCE OF NOVA SCOTIA BY ORIGIN AND SPECIES: Total Quantity, Total Cost and Average Cost.

Species.	TOTAL QUANTITY USED (Canadian and Imported)			CANADIAN TIMBER			
	Quantity.	Cost.	Per Cent Distri- bution.	Quantity.	Cost.	Average cost per M.	Per Cent of Total.
	M ft. B. M.	\$		M ft. B. M.	\$	\$ cts.	
Total.....	17,306	323,497	100	5,083	82,951	16 50	29.3
Yellow Pine.....	9,892	186,000	57.2				
Oak.....	2,358	71,746	13.7	101	2,600	25 84	4.3
Birch.....	1,253	13,854	7.3	1,253	13,854	11 06	100
Spruce.....	1,118	14,535	6.5	1,118	14,535	12 98	100
Douglas Fir.....	904	22,570	5.2	904	22,570	23 80	100
Pine*.....	805	14,682	4.7	805	14,682	18 24	100
Beech.....	300	2,700	1.7	300	2,700	9 00	100
Maple.....	300	2,700	1.7	300	2,700	9 00	100
Basswood.....	175	6,600	1.0	175	6,600	37 71	100
Poplar.....	88	1,350	0.5	88	1,350	15 34	100
Tulip.....	40	2,000	0.2				
Elm.....	35	1,300	0.2	35	1,300	37 1	1 0
Mahogany.....	20	2,500	0.1				
Black Cherry.....	7	700	†				
Chestnut.....	5	100	†				
Ash.....	2	100	†				

IMPORTED TIMBER.				
Total.....	12,223	240,546	19 08	70.7
Yellow Pine.....	892	186,000	18 80	100
Oak.....	2,257	49,146	21 77	95.7
Birch.....				
Spruce.....				
Douglas Fir.....				
Pine*.....				
Beech.....				
Maple.....				
Basswood.....				
Poplar.....				
Tulip.....	40	2,000	50 00	100
Elm.....				
Mahogany.....	20	2,500	125 00	100
Black Cherry.....	7	700	100 00	100
Chestnut.....	5	100	20 00	100
Ash.....	2	100	50 00	100

* Includes white and red pine.

† Less than one-tenth of one per cent.

Sixteen species of wood are used in Nova Scotia. Seven tenths of the wood used is imported, three tenths produced in Canada. The great preponderance of imported wood is explained by the large use of yellow pine for car building. Nova Scotia is not rich in woods suitable for furniture and is not advantageously situated with reference to a furniture market, but has large car shops, and the greater proportion of the wood listed in table 6 was used in the manufacture of freight cars.

As in Quebec, yellow pine is the most important species, forming 57.2 per cent of the total consumption. 9,892,000 feet were used, all imported, at a cost of \$18.80 per thousand. This amount is nearly as great as Quebec's consumption, but the cost is \$11.83 per thousand less in Nova Scotia.

Oak stands second in importance; 2,358,000 feet were used, of which 2,257,000 feet, or 95.7 per cent, were imported at a cost of \$21.77 per thousand. The native wood in Nova Scotia cost \$25.84 per thousand, or \$3.02 per thousand more than in Quebec, but the imported wood cost \$2.23 less than in Quebec. As in Ontario, this is an instance where native oak cost more than the imported wood.

Birch, supplying 1,253,000 feet, forms 7.3 per cent of the total, and is all native wood. It cost on the average \$11.06 per thousand, or \$6.50 less than birch in Quebec.

The above three species, yellow pine, oak and beech, form 78.2 per cent of the total amount used in Nova Scotia.

Though a large proportion of the wood used in Nova Scotia was imported, the manufacturers of Nova Scotia succeeded in securing timber at a lower price than the manufacturers of any other province.

Table 7 shows the quantity, total cost and average cost of the timber used in the furniture industry of Prince Edward Island, by species and origin, together with the proportion each forms of the total, and the proportion of each species grown in Canada or imported.

TABLE 7.

WOOD USED BY FURNITURE MANUFACTURERS, 1910, IN PROVINCE OF PRINCE EDWARD ISLAND
BY ORIGIN AND SPECIES: Total Quantity, Total Cost and Average Cost.

Species	TOTAL QUANTITY USED, (Canadian and Imported)			CANADIAN TIMBER			
	Quantity.	Cost.	Per Cent Distri- bution.	Quantity	Cost.	Average cost per M.	Per Cent of Total.
	M ft. B.M.	\$		M ft. B.M.	\$	\$ cts.	
Total.....	79	1,910	100	77	1,685	21 88	97.5
Spruce.....	53	1,100	67.0	53	1,100	20 75	100
Pine*.....	12	360	15.0	12	360	30 00	100
Hemlock.....	5	75	6.1	5	75	15 00	100
Birch.....	3	30	3.7	3	60	20 00	100
Maple.....	3	60	3.7	3	60	20 00	100
Oak.....	2	225	2.4				
Ash.....	1	30	1.1	1	30	30 00	100
IMPORTED TIMBER							
Total.....				2	225	112 50	2.5
Spruce.....							
Pine*.....							
Hemlock.....							
Birch.....							
Maple.....							
Oak.....				2	225	112 50	100
Ash.....							

* Includes white and red pine.

There are no car manufacturers in Prince Edward Island, and, owing both to lack of market and lack of timber supplies, furniture manufacturing is very limited. Seven woods are used in Prince Edward Island. Six of these are Canadian timbers, produced on the island, and one, oak, is imported. Although such a large proportion is native-grown the average price of the timber used is higher than in any other province, except Ontario.

AGRICULTURAL IMPLEMENTS AND VEHICLES.

As agricultural implements and vehicles to a certain extent require woods of different qualities from those used in the manufacture of furniture and cars, the timber used in this industry will be discussed separately. The 162 manufacturers represented in this report are located as follows:—97 in Ontario, 41 in Quebec, 11 in Prince Edward Island, 6 in New Brunswick, 4 in Manitoba, and 3 in Nova Scotia. There are practically no implement or vehicle manufacturers in Saskatchewan, Alberta and British Columbia.

The implement and vehicle works of Manitoba use an average of 846,000 feet of timber per year; those of Ontario, where are located nearly all the large factories in Canada and many small ones, 698,000 per year; in the other provinces the average consumption of timber per factory per year is: Nova Scotia, 131,000; Quebec, 113,000; New Brunswick, 35,000; Prince Edward Island, 9,000.

In table 8 is shown by provinces the total quantity and cost of the timber used by the agricultural implement and vehicle manufacturers of Canada, the proportion of the timber used in each province, the total quantity, total cost or average cost of the native-grown and imported timber used and the proportion each forms of the total.

TABLE 8

TIMBER USED BY AGRICULTURAL IMPLEMENT AND VEHICLE MANUFACTURERS OF CANADA
BY PROVINCES: Total Quantity, Total Cost and Per Cent Distribution with Quantity
Total Cost and Average Cost of Canadian and Imported Timber Used.

Province.	TOTAL QUANTITY USED (Canadian and Imported)			CANADIAN TIMBER			
	Quantity.	Cost.	Per Cent Distri- bution.	Quantity.	Cost.	Average cost per M.	Per Cent of Total
	M ft. B.M.	\$		M ft. B.M.	\$	s. cts.	
Canada..	76,474	2,513,265	100	49,964	1,230,071	24 64	65.3
Ontario..	67,781	2,200,187	88.6	44,513	1,111,394	24 97	65.6
Quebec..	4,631	96,993	6.5	4,546	92,688	20 39	98.1
Manitoba..	3,383	109,782	4.1	274	11,720	42 79	8.1
Nova Scotia..	394	10,640	0.5	355	9,140	25 75	90.1
New Brunswick..	191	4,134	0.2	184	3,769	20 48	96.3
P. E. Island..	94	1,529	0.1	92	1,360	14 78	97.9
IMPORTED TIMBER							
Canada..				26,510	1,283,194	48 40	34.7
Ontario..				23,268	1,088,793	46 80	34.4
Quebec..				85	4,305	50 65	1.9
Manitoba..				3,109	188,062	60 50	91.9
Nova Scotia..				39	1,500	38 46	9.9
New Brunswick..				7	365	52 14	3.7
P. E. Island..				2	160	81 50	2.1

The agricultural implement and vehicle manufacturers of Canada used in 1910 about 76,500,000 board feet of timber, costing about \$2,500,000, an average cost of \$32.86 per thousand. Two thirds of the total quantity was grown in Canada, one third was imported. The average cost of the Canadian wood was \$24.64 per thousand, the average cost of the imported wood was just about twice as great, \$48.40 per thousand, so that, though only about one half as much wood was imported as was secured in Canada, more money was paid for imported wood than for Canadian.

About 41,500,000 feet less timber was used for the manufacture of agricultural implements and vehicles than for the manufacture of furniture and cars. The same proportions of imported and Canadian wood were used in each industry.

An indication of the superior qualities of the timber used for vehicles and implements is the fact that it cost on the average \$7.51 more per thousand than the timber used for furniture and cars. Every province, excepting Prince Edward Island, paid more for implement and vehicle timber than for furniture and car timber.

About eight ninths of the vehicle and implement manufacturing of Canada is carried on in Ontario, the factories of which used nearly 68,000,000 feet of timber in 1910, worth \$2,200,000. The remaining one ninth of the timber consumed is practically all used in Quebec and Manitoba. Nova Scotia, New Brunswick and Prince Edward Island together represent less than one per cent of the total consumption, and together use annually less than 700,000 feet of timber.

Though Ontario is the province originally most richly provided with timber suitable for manufacturing, and though there are still in Ontario greater supplies of hardwoods than elsewhere, one third of the timber used in Ontario is imported. Nearly all the timber used for vehicles and implements in Quebec was produced locally, less than two per cent being imported. The absence of oak and yellow pine from the woods used in Quebec for implements and vehicles materially reduces the proportion of imported wood used, which for furniture and cars was 35.6 per cent. Quebec used a smaller proportion of imported wood than any other province. Less than one twelfth of the wood used in Manitoba was Canadian-grown and practically none of it was produced in the province of Manitoba. Over nine-tenths of the wood used in Nova Scotia, New Brunswick and Prince Edward Island was native-grown wood. All the wood imported for implements and vehicles was used in Ontario and Manitoba. Quebec and Nova Scotia, which together imported 25,000,000 feet of timber for car and furniture manufacturing, imported only a little over 100,000 feet for implements and vehicles.

The cost of imported timber was 100 per cent greater than that of native timber, even though the imported timber is not much, if any, superior in quality to Canadian timber. Of the three provinces using practically all the wood the average price was lowest in Quebec, where practically all native wood was used, and highest in Manitoba, where nearly all the wood used was imported and carried high transportation charges. Implement and vehicle manufacturing is handicapped in Manitoba by the fact that the province furnishes no suitable woods, that Canadian woods cost \$17.82 more than in Ontario and that imported woods cost \$13.70 more than in Ontario. Native woods appear cheaper in Quebec than in Ontario because the expensive species of wood used in Ontario were not used in any quantity in Quebec.

Table 9 gives the total quantity and total cost of each species of wood used in the manufacture of implements and vehicles, the per cent each species forms of the total, the total quantity, total cost, average cost and proportion native-grown or imported of each species.

TABLE 9.

TIMBER USED BY AGRICULTURAL IMPLEMENT AND VEHICLE MANUFACTURERS OF CANADA, BY ORIGIN AND SPECIES: Total Quantity, Total Cost, Per Cent Distribution, with Quantity, Total Cost and Average Cost of Canadian and Imported Timber Used.

Species.	TOTAL QUANTITY USED, (Canadian and Imported.)			CANADIAN TIMBER.			
	Quantity.	Cost.	Per Cent Distribu- tion.	Quantity.	Cost.	Average cost per M.	Per Cent of Total.
	M ft. B.M.	\$		M ft. B.M.	\$	\$ cts.	
Total	76,474	2,513,265	100	49,964	1,230,071	24 64	65.3
Elm	11,360	262,224	14.9	11,119	253,233	22 77	97.9
Maple	10,932	295,708	14.4	10,836	289,555	26 72	99.7
Oak	10,607	571,322	13.9	1,713	64,644	37 74	16.1
Basswood	9,881	243,097	13.0	9,140	218,452	23 90	92.5
Yellow Pine	7,477	279,588	9.9				
Ash	4,828	133,388	6.4	4,042	98,834	24 45	83.7
Birch	4,823	109,411	6.4	4,549	95,341	20 97	94.3
Hickory	4,667	245,063	6.1	615	22,054	35 85	13.2
Pine*	4,629	111,102	6.1	4,615	110,738	24 00	99.7
Spruce	2,087	35,767	2.8	2,087	35,767	17 14	100
Cottonwood	1,458	68,576	2.0	96	3,761	39 19	6.6
Gum	1,261	40,682	1.7				
Tulip	856	57,647	1.2				
Cypress	378	14,452	0.5				
Hemlock	172	3,177	0.3	172	3,177	18 47	1.0
Balsam Poplar	150	2,250	0.2	150	2,250	15 00	100
Black Cherry	108	1,116	0.1	65	6,790	104 00	60.2
Douglas Fir	90	33	0.1	75	2,843	37 90	83.4
Cedar	79	1,508	0.1	79	1,508	19 11	100
Beech	63	1,029	0.1	63	1,029	16 33	100
Balsam Fir	59	849	0.1	59	849	14 39	100
Aspen Poplar	34	1,019	0.1	34	1,019	29 94	100
Chestnut	21	455	†	21	455	21 66	100
Mahogany	20	2,400	†				
Tamarack or larch	5	88	†	5	88	17 60	100
Ironwood	5	75	†	5	75	15 00	100
Butternut	1	16	†	1	16	16 00	100
IMPORTED TIMBER.							
Total				26,510	1,283,194	48 40	34.7
Elm				241	8,991	37 30	2.4
Maple				96	6,153	64 09	0.9
Oak				8,894	506,678	57 07	83.9
Basswood				741	24,645	33 26	7.5
Yellow Pine				7,477	279,588	37 39	100
Ash				786	34,554	43 96	16.3
Birch				274	14,070	51 35	5.7
Hickory				4,052	223,009	55 03	86.8
Pine*				14	364	26 00	0.3
Spruce							
Cottonwood				1,362	64,815	47 65	93.4
Gum				1,261	40,682	32 26	100
Tulip				856	57,647	67 35	100
Cypress				373	14,452	38 24	100
Hemlock							
Balsam Poplar							
Black Cherry				43	4,386	102 00	39.8
Douglas Fir				15	760	50 66	16.6
Cedar							
Beech							
Balsam Fir							
Aspen Poplar							
Chestnut							
Mahogany				20	2,400	120 00	100
Tamarack or larch							
Ironwood							
Butternut							

* Includes white and red pine.

† Less than one-tenth of one per cent.

‡ Includes a small amount not identified by species.

There were twenty-seven woods used in 1910 for vehicle and implement manufacturing, as compared with twenty-five used for furniture and cars. The woods used for implements and vehicles, but not for furniture and cars, were hickory, cypress, balsam poplar, cedar, balsam fir and ironwood.* The woods used for furniture and cars, but not for implements and vehicles, were chiefly ornamental woods; they were black walnut, Circassian walnut, teak and Spanish cedar. The species forming over ten per cent each of the total used for agricultural implements and vehicles were elm, maple, oak and basswood. The species forming over ten per cent each of the total used for furniture and cars were yellow pine, oak, maple and birch.

Out of the total of twenty-seven species in table 9, nineteen are wholly or chiefly produced in Canada, viz., elm, maple, basswood, ash, birch, pine, spruce, hemlock, balsam poplar, black cherry, Douglas fir, cedar, beech, balsam fir, aspen poplar, chestnut, tamarack, ironwood and butternut. Eight species are wholly or chiefly imported, viz.: Oak, yellow pine, hickory, cottonwood, gum, tulip, cypress and mahogany.

Yellow pine and oak make up the greater part of the wood imported for the manufacture of furniture and cars. Oak, yellow pine and hickory make up the greater part of the wood imported for agricultural implements and vehicles.

The woods used for implements and vehicles are necessarily strong, tough, and hard, only a small proportion of finishing woods being used.

Elm is the chief wood used for implements and vehicles in Canada; in 1910 it constituted nearly fifteen per cent of the total. Only about two per cent of the elm used in Canada was imported; \$22.79 was paid for Canadian elm and \$37.30 for imported elm. Elm includes rock elm and white elm. Rock elm is stronger than maple, but not as stiff. It is twice as tough as maple and a little harder. Rock elm is considerably stronger than white elm and about 45 per cent harder. White elm is tougher than maple. Rock elm increases in hardness with increase in weight. Elm is, because of its strength, hardness, toughness and comparative cheapness, admirably fitted for use in all implements and vehicles. Rock elm is especially used for hubs, spokes and vehicle bodies; it is also used for the frames of practically all implements except where stiffness is particularly required. Soft elm is used for plough handles, for light implement frames and for crating.

Elm was used to a greater extent for implements and vehicles than for furniture and cars. It was eighth on the list in the latter industry. The cost was the same to both classes of manufacturers.

Almost as much maple was used as elm. Nearly 11,000,000 feet were used in 1910, less than one per cent of which was imported. The cost of the native maple was \$26.72, the cost of the imported, \$64.09.

Maple includes red and sugar maple. There is very little difference in stiffness between the two species. Red maple is slightly tougher than sugar maple. Sugar maple is twenty-five per cent harder than red maple. The strength and toughness of red maple increases with slowness of growth. The hardness of red and sugar maple increases with increase of weight. Sugar maple weighs when green, 56.40 pounds per cubic foot, when dry, 36.00 pounds per cubic foot, and has a modulus of rupture of 55.20 pounds per square inch. Red maple weighs when green, 54.60 pounds per cubic foot, when dry, 32.31 pounds per cubic foot, and has a modulus of rupture of 8,310 pounds per square inch. Sugar maple is used for wagon and buggy axles, and generally in wagon work; it is used for the frames of implements chiefly when stiffness is required. Hard maple is increasingly used as a substitute for oak. Red maple is used in light implements and in heavy implements where hardness and stiffness are not particularly required.

Almost fifty per cent more maple was used for furniture and cars, where it was third in the list, than for implements and vehicles. The proportion of Canadian-

* The species here called 'ironwood' is that which also goes by the name of 'hop hornbeam' and is known botanically as *Ostrya virginiana*.

grown wood was the same in both industries, but the average cost was \$5.98 less to the furniture and car manufacturers than to the implement and vehicle industry.

Though practically all the oak used in Canada must be imported, practically every class of manufacturers can get along without it. It combines so well the valuable qualities of strength, hardness, toughness, stiffness and beauty of grain. Over 10,500,000 feet were used for implements and vehicles in 1910, of which five-sixths was imported at \$57.07 per thousand, and one-sixth produced in Canada at \$37.74 per thousand. Oak is the most expensive wood used in large quantities and a greater total amount is paid for oak than for any other species. Several species of white and red oak are imported and classified as oak.

Over fifty per cent more oak is used for furniture and cars than for implements and vehicles. About 97 per cent of the oak used for furniture and cars is imported. The cost of the wood imported for furniture and cars is \$11.56, the cost of the wood imported for implements and vehicles is \$57.07, an indication that the vehicle and implement wood is of a higher grade.

The fourth wood used for implements and vehicles is basswood, of which nearly 10,000,000 feet were used in 1910. Eleven twelfths of the basswood used was native-grown at \$23.90 per thousand, one twelfth imported at \$33.26 per thousand. Most of the imported basswood came from Maine. Basswood is a light, tough, fairly strong, smooth, easily worked, even-grained wood. It is used for bent work and panels in light vehicles and for panels, tables and boxes in implements. It is largely used for wagon and buggy boxes. About 33 per cent more basswood was used for implements and vehicles than for furniture and cars. All the basswood used for furniture and cars was native-grown, costing \$23.07, almost one dollar less than the \$23.90 paid by manufacturers of implements and vehicles.

All the yellow pine used is imported from the southern States. About 7,500,000 feet of yellow pine were used in 1910, costing \$37.39 per thousand. Yellow pine is a hard, stiff, strong wood used for wagon boxes and tongues, for implement tongues and frames. For these uses Douglas fir might be used as a substitute for yellow pine as discussed above.

Almost three times as much yellow pine is used for cars and furniture, chiefly cars, as for implements and vehicles. Evidently a higher grade is used for implements than for cars, the average price of the car timber being \$25.35. The car works buy in larger quantities than do the implement works.

About 4,500,000 feet of hickory were used for vehicles and implements in 1910. Several species of hickory are included, but the chief are shagbark, bitternut and mockernut. Hickory was once fairly plentiful in the agricultural region of southern Ontario but is now almost commercially extinct. About one-eighth of the hickory used in 1910 was produced in Canada, seven-eighths was imported from the United States. The average cost of the imported hickory, \$55.93, was over 50 per cent greater than the cost of the Canadian wood. Hickory, because of its toughness, elasticity, hardness and strength, is used chiefly in vehicle manufacture for automobile and buggy spokes, buggy poles, axles, axle caps, cross-bars, wagon-reaches, double-tree, single-trees, shafts, tongues, felloes, gears, rims, sledge handles, pick handles and small tool handles. It is also used in agricultural implements where strength and elasticity are required, as in pitman shafts in mowers. Much of the hickory used in Canada in vehicle manufacturing is imported already shaped and is not represented in table 10. No hickory is used in furniture or car building. Hickory is a wood, the available supply of which is rapidly decreasing. It will be necessary before many years to use different Canadian woods as substitutes for hickory.

Nearly 5,000,000 feet of ash were used in this industry in Canada in 1910. White ash and black are both used, the latter in large quantities. About 84 per cent of the ash used is native-grown, costing \$24.45; 16 per cent is imported, costing \$43.96. Ash is neither so strong nor so stiff as maple, birch, oak or elm, but it is tough and

elastic and is a staple wood for implement frames and panelling, for plough-beams, ribs for buggy tops, buggy bodies, frames for other vehicle bodies, wagon beds, gears, sills, hames, small tool handles and long handles.

Nearly 40 per cent more ash is used for implements and vehicles than for furniture and cars. A larger proportion of ash is imported for agricultural implements and vehicles than for furniture and cars. This is partially due to the fact that black ash is suitable for furniture, whereas implement and vehicle manufacturers prefer white ash, which is not so plentiful in Canada as the black.

Almost as much birch as ash is used in Canada. Nearly 5,000,000 feet of birch were used in 1910, 94.3 per cent of which was produced in Canada at \$20.97 per thousand, and 5.7 per cent of which was imported at \$51.35 per thousand. It is noticeable that birch is the cheapest Canadian hardwood used in any quantity. Yellow birch is the birch chiefly used. Birch is hard, strong, stiff, and is used for agricultural implement frames and siding, for automobile bodies, wagon sills, hubs and axles, for sleigh runners and benches and for carriage frames. Birch is abundant in Canada and its use is certain to increase. Less than one-third as much birch is used for implements and vehicles as for furniture and cars. That used for furniture cost \$1.76 less than that used for implements.

White and red pine together supply over 4,500,000 feet annually for implements and vehicles. This is practically all produced in Canada at a cost of \$24 per thousand. Pine is light, fairly strong, is easily worked and is used for pattern-stock panels, partitions, seats and boxes for implements and vehicles, for the frames of light implements, buggy bodies and for crates and boxes. Less than half as much pine is used for implements and vehicles as for furniture and cars. That used for implements and vehicles is the more expensive by \$3.62 per thousand.

The above nine woods formed over nine tenths of the total consumption.

Over 2,000,000 feet of spruce are used each year in the industry. The spruce is native-grown, costing \$17.12 per thousand, and is the cheapest wood used in any quantity. Spruce is light, elastic, of medium strength and is used chiefly in implements for panels, boxes and light attachments, and in vehicles for wagon boxes, buggy bodies and seats and generally for shipping packages. Nearly five times as much spruce was used for furniture and cars as for implements and vehicles.

About 1,500,000 feet of cottonwood are used annually for implements and vehicles in Canada. Practically the whole of this is imported from the central United States at a cost of \$47.65 per thousand. Less than 100,000 feet are secured in Canada. This wood is confused with aspen, balsam poplar, and tulip. Cottonwood is white, light, of medium strength, is easily worked and holds its place well. It is used for buggy and cutter boxes and seats, for wagon beds and boxes, and for panels, sidings and boxing in implements. Very little cottonwood is used for furniture and cars.

Gum is a hardwood not native to Canada in commercial quantities, which is imported for use in the implement industry. About 1,250,000 feet of gum were used in 1910 at an average cost of \$32.26 per thousand. Gum is hard, strong and elastic and is used chiefly by the largest implement factories for wagon boxes, wagon beds, buggy and wagon hugs, automobile bodies, buggy bodies and implement frames. Fifty per cent more gum is used for implements and vehicles than for furniture and cars. Approximately the same price is paid by each industry.

The timber woods discussed above are those which are used in quantities of one million feet or more per year. With the exception of tulip the remaining woods are comparatively unimportant.

About 850,000 feet of tulip were used in 1910, all of which was imported at a cost of \$67.35 per thousand. Tulip (known also as whitewood or yellow poplar), is a light, tough wood, easily worked and free from warping or checking. It is used for bent work or panels in carriages and automobiles, for buggy-seats, wagon-boxes,

vehicle bodies and implement panels. Cottonwood, poplar and pine are being substituted for tulip. More tulip was used for implements and vehicles than for furniture and cars. This wood cost the same to each industry.

Over one-third of a million feet of cypress was used in 1910. The wood is native to the southern coast of the United States, whence it was imported at \$38.24 per thousand. Cypress is a heavy, strong, fairly hard, very durable wood, which is easily worked and exceptionally free from warping or checking. It is used chiefly in implement manufacturing. A quantity is used for wagon beds. It is admirably adapted for use in those farm implements which are likely to be exposed to the weather, and in consideration of its qualities is much cheaper than the elm, ash, birch, cottonwood and gum which were imported in large quantities. No cypress was used for furniture or car building.

Of the thirteen species which were used in small quantities, hemlock, balsam poplar, cedar, balsam fir and aspen poplar, were used where strength was not required for siding or crating, chiefly for implements; Douglas fir, beech, chestnut, tamarack and ironwood were used chiefly for implements in the building of frames. Black cherry, mahogany and butternut were used for finishing purposes.

In table 10 is given the total quantity, total cost and per cent distribution by species of the timber used in agricultural implement and vehicle manufacturing in Ontario in 1910, together with the total quantity, total cost, average cost per thousand feet and proportion of Canadian and imported wood used of each species.

TABLE 10

TIMBER USED BY AGRICULTURAL IMPLEMENT AND VEHICLE MANUFACTURERS, 1910, IN PROVINCE OF ONTARIO, BY ORIGIN AND SPECIES: Total Quantity, Total Cost, Per Cent Distribution and Average Cost per M.B.F.

Species	TOTAL QUANTITY USED (Canadian and Imported.)			CANADIAN TIMBER.			
	Quantity	Cost.	Per Cent Distribu- tion.	Quantity.	Cost.	Average cost per M.	Per Cent of Total.
	M ft. B. M.	\$		M ft. B. M.	\$	\$ cts.	
Total (†)	67,781	2,200,187	100	41,513	1,111,394	24 97	65.6
Elm	11,113	254,392	16.8	10,947	248,521	22 70	98.6
Maple	10,185	271,507	15.1	10,180	271,269	26 65	100
Oak	8,687	443,960	12.8	1,625	59,859	36 22	18.7
Basswood	8,644	208,446	12.8	8,371	199,273	23 80	96.9
Yellow Pine	7,442	277,968	11.0				
Hickory	4,154	229,717	6.6	611	21,753	35 60	13.3
Ash	4,124	112,958	6.1	3,407	82,566	24 22	82.6
Pine*	4,086	98,035	6.1	4,086	98,035	21 54	100
Birch	3,203	74,788	4.7	3,203	74,785	23 35	100
Cottonwood	1,433	67,326	2.1	71	2,541	35 37	5.1
Gum	1,232	39,530	1.8				
Spruce	1,219	21,949	1.8	1,219	21,949	18 00	100
Tulip	778	52,426	1.1				
Cypress	368	13,906	0.5				
Balsam Poplar	150	2,250	0.2	150	2,250	15 00	100
Hemlock	149	2,728	0.2	149	2,728	18 21	100
Black Cherry	65	6,760	0.1	65	6,760	104 00	100
Beech	51	824	0.1	51	824	16 15	100
Douglas Fir	50	2,093	0.1	50	2,093	41 86	100
Cedar	49	1,238	0.1	49	1,238	25 26	100
Chestnut	21	455	†	21	455	21 66	100
Mahogany	20	2,400	†				
Aspen Poplar	13	410	†	13	410	31 54	100
Balsam Fir	10	150	†	10	150	15 00	100
Tamarack or Larch	5	88	†	5	88	17 60	100
Ironwood	5	75	†	5	75	15 00	100
Sycamore	1	16	†	1	16	16 00	100
IMPORTED TIMBER.							
Total (†)				23,268	1,088,793	46.81	34.4
Elm				166	5,871	35.37	1.4
Maple				5	238	47.60	†
Oak				7,062	384,110	54.45	81.3
Basswood				273	9,173	33.60	3.1
Yellow Pine				7,442	277,968	37.35	100
Hickory				3,843	207,964	54.11	86.7
Ash				717	30,392	42.39	17.4
Pine*							
Birch							
Cottonwood				1,362	64,815	47.65	94.9
Gum				1,232	39,530	32.08	100
Spruce							
Tulip				778	52,426	67.39	100
Cypress				368	13,906	37.80	100
Balsam Poplar							
Hemlock							
Black Cherry							
Beech							
Douglas Fir							
Cedar							
Chestnut							
Mahogany				20	2,400	120.00	100
Aspen Poplar							
Balsam Fir							
Tamarack or Larch							
Ironwood							
Sycamore							

*Includes white and red pine.

†Less than one-tenth of one per cent.

‡Includes a small amount not identified by species.

The manufacture of implements and vehicles is chiefly centred in Ontario. It is not surprising, therefore, to learn that all the species used in Canada are used in Ontario, and that every species, excepting balsam fir and aspen poplar, is used to a greater extent in Ontario than in all the other provinces together. The only woods of which Ontario did not use over 80 per cent of the total used in Canada were birch, spruce, cherry, Douglas fir and cedar.

Ontario is the province best supplied with timber suitable for manufacturing, yet one third of the woods used in Ontario were imported and 50 per cent of the money paid for woods is paid for imported woods. Oak and yellow pine are two of the most important species used. Although nearly all the native oak used in Canada is cut in Ontario, 81.3 per cent of the oak used in Ontario is imported. All the yellow pine is imported.

Ontario furnishes practically all the native hickory of Canada. It is sufficient for only 13.3 per cent of the needs of the province. The remainder is imported. The native hickory is of lower grade than the imported hickory, more because only cull hickory remains in Canada than because good hickory cannot be produced in Canada.

The prices paid in Ontario were approximately the same as the average for Canada. The cheapest wood used in Ontario was spruce, all of which was native, costing \$17.14. The most expensive was native cherry, costing \$104. Imported timbers used in large quantities which cost much more than native wood of the same species were: Elm, oak, basswood, ash, birch, hickory and cottonwood. The high prices paid for timber of these species—without which manufacturers would be crippled—imported because the forests of Ontario, once so rich, no longer supply high grades, are a certain indication that Canada is now suffering a famine of the better qualities of hardwoods.

Table 11 shows the total quantity, total cost and per cent distribution by species of the timber used in agricultural implement and vehicle manufacturing in Quebec, in 1910, also the total quantity, total cost, average cost per thousand feet and proportion of Canadian and imported wood used of each species.

TABLE 11.

TIMBER USED BY AGRICULTURAL IMPLEMENT AND VEHICLE MANUFACTURERS, 1910, IN PROVINCE OF QUEBEC, BY ORIGIN AND SPECIES: Total Quantity, Total Cost, and Per Cent Distribution and Average Cost per M B.F.

Species.	TOTAL QUANTITY USED (Canadian and Imported.)			CANADIAN TIMBER			
	Quantity.	Cost.	Per Cent. Distri- bution.	Quantity.	Cost.	Average cost per M.	Per Cent. of Total.
	M ft. B. M.	\$		M ft. B. M.	\$	\$ cts.	
Total (†).....	4,631	96,993	100	4,546	92,688	20 39	98 1
Birch.....	1,150	17,250	25 2	1,150	17,250	15 00	100
Spruce.....	741	11,540	16 2	741	11,540	15 57	100
Basswood.....	677	15,669	15 1	677	15,669	23 15	100
Ash.....	609	15,229	13 3	609	15,229	25 00	100
Maple.....	546	12,721	12 2	546	12,721	23 30	100
Pine*.....	449	10,207	10 0	435	9,843	22 63	99 7
Elm.....	127	3,112	2 9	127	3,112	24 50	100
Oak.....	64	3,980	1 4	62	3,855	62 18	99 7
Balsam Fir.....	49	699	1 1	49	699	14 27	100
Yellow Pine.....	35	1,620	0 8				
Cedar.....	30	270	0 7	30	270	9 00	100
Hickory.....	19	1,426	0 4	4	301	75 25	21 0
Tulip.....	19	1,071	0 4				
Hemlock.....	13	169	0 3	13	169	13 00	100

IMPORTED TIMBER.				
Total (†).....	85	4,305	50 65	1 9
Birch.....				
Spruce.....				
Basswood.....				
Ash.....				
Maple.....				
Pine*.....	14	364	26 00	0 3
Elm.....				
Oak.....	2	125	62 50	0 3
Balsam Fir.....				
Yellow Pine.....	35	1,620	46 28	100
Cedar.....				
Hickory.....	15	1,125	75 00	79 0
Tulip.....	19	1,071	56 37	100
Hemlock.....				

*Includes white and red pine.

†Includes a small amount not identified by species.

The agricultural implement and vehicle factories of Quebec are comparatively few and small and used only about 4,500,000 feet of timber in 1910, costing not quite \$100,000. That Quebec does not manufacture a larger proportion of the implements and vehicles of Canada is partly due to the fact that Quebec never possessed such a large supply or great variety of valuable woods as was originally found in Ontario.

Fourteen species of wood were used in Quebec as compared with 27 in Ontario. The species not used in Quebec were chiefly unimportant; they comprised cottonwood,

gum, cypress, balsam poplar, black cherry, beech, Douglas fir, chestnut, mahogany, aspen, poplar, tamarack, ironwood and butternut.

Not so large a proportion of valuable species is used in Quebec as in Ontario: birch, spruce, basswood, ash, maple and pine constitute 93 per cent of the timber used. Elm, oak, yellow pine and hickory are but little used in Quebec. It is owing to this small use of high-grade timber that the manufacturers of Quebec import only 1.9 per cent of their timber consumption. Only 85,000 feet of imported timber were used.

The average cost of all the timber used in Quebec was \$21.40 as compared with \$32.46, the average cost of all the timber used in Ontario. Birch cost \$15 in Quebec and \$23.35 in Ontario; spruce cost \$15.57 in Quebec and \$18 in Ontario; basswood which is not plentiful in Quebec, cost \$23.15 in Quebec and \$23.80 in Ontario; ash cost \$25 in Quebec and \$24.22 in Ontario; maple cost \$23.30 in Quebec and \$26.65 in Ontario. The other species, used in very small quantities in Quebec, cost more in that province. The low cost of medium-grade woods in Quebec is due to the larger supply in that province and to the lack of such demand as exists in Ontario.

In table 12 is shown the total quantity, total cost and per cent distribution by species of the timber used in agricultural implement and vehicle manufacturing in Manitoba in 1910, together with the total quantity, total cost, average cost per thousand feet and proportion of Canadian and imported wood used of each species.

TABLE 12.

TIMBER USED BY AGRICULTURAL IMPLEMENT AND VEHICLE MANUFACTURERS, 1910, IN
PROVINCE OF MANITOBA BY ORIGIN AND SPECIES: Total Quantity, Total Cost,
Per Cent Distribution and Average Cost per M.B.F.

Species.	TOTAL QUANTITY USED. (Canadian and Imported.)			CANADIAN TIMBER.			
	Quantity.	Cost.	Per Cent Distribution.	Quantity.	Cost.	Average cost per M.	Per Cent. of Total.
	M ft. B.M.	\$		M ft. B.M.	\$	\$ cts.	
Total.....	3,363	190,782	100	274	11,730	43 79	8.1
Oak.....	1,835	122,743	54.3	8	300	60 00	2.7
Basswood.....	472	15,663	14.0	8	250	50 00	1.0
Birch.....	274	14,070	8.1				
Hickory.....	159	12,720	4.7				
Maple.....	157	10,205	4.7	66	4,290	65 00	31.2
Elm.....	110	4,520	3.3	35	1,400	40 00	31.8
Pine*.....	86	2,700	2.6	86	2,700	31 40	100
Ash.....	69	4,162	2.0				
Tulip.....	47	3,375	1.4				
Black Cherry.....	43	4,386	1.3				
Douglas Fir.....	40	1,510	1.2	25	750	30 00	62.5
Gum.....	29	1,152	0.8				
Cottonwood.....	25	1,250	0.7	25	1,250	50 00	100
Aspen Poplar.....	17	500	0.5	17	500	29 41	100
Hemlock.....	10	280	0.3	10	280	28 00	100
Cypress.....	10	546	0.3				

IMPORTED TIMBER.				
Total..	3,100	188,062	60 50	91.9
Oak.....	1,830	122,443	66 90	97.3
Basswood.....	467	15,413	33 00	9.9
Birch.....	274	14,070	51 36	100
Hickory.....	159	12,720	80 00	100
Maple.....	91	5,915	65 00	68.8
Elm.....	75	3,120	41 60	68.2
Pine*.....				
Ash.....	69	4,162	60 32	100
Tulip.....	47	3,375	71 81	100
Black Cherry.....	43	4,386	102 00	100
Douglas Fir.....	15	760	50 66	37.5
Gum.....	29	1,152	39 72	100
Cottonwood.....				
Aspen Poplar.....				
Hemlock.....				
Cypress.....	10	546	54 60	100

*Includes red and white pine.

The great use of vehicles and agricultural implements on the Canadian prairies has built up a repairing and manufacturing industry in Manitoba, though practically all the wood used must be imported.

There were used in Manitoba in 1910 about 3,400,000 feet of timber, of which 3,100,000 feet were imported into Canada, and of which practically none was produced in Manitoba.

The handicap which a total lack of manufacturing timber imposes on Manitoba is shown by the high cost of wood in that province; the average price paid for timber in Manitoba is \$59.03 as compared with \$32.46 in Ontario.

Sixteen species were used in Manitoba. Of these, five—oak, basswood, birch, hickory and maple—formed 85 per cent of the total. A larger proportion of oak was used in Manitoba than in any other province; over one-half the timber used in Manitoba was oak. No yellow pine was used in Manitoba and very little Douglas fir. Douglas fir should find a market with the implement manufacturers of Manitoba.

Oak cost \$66.90 in Manitoba, and \$54.45 in Ontario; basswood, \$33 in Manitoba and \$23.80 in Ontario; birch, \$51.36 in Manitoba and \$23.35 in Ontario; hickory, \$80 in Manitoba and \$54.11 in Ontario; maple, \$65 in Manitoba and \$26.65 in Ontario; elm, \$41.00 in Manitoba and \$22.70 in Ontario.

When these prices are considered it is easy to understand why so large a proportion of the implements used in the Canadian west are manufactured in Ontario.

Oak, birch and elm are native to Manitoba. They reach merchantable sizes and produce valuable timber in the Dominion Forest Reserves of that province. It is the aim of the Forestry Branch to increase the quantities of these timbers produced on the forest reserves so that in time they may be available for manufacturing purposes.

Table 13 shows by origin and species the total quantity, total cost and average cost of the lumber used by the manufacturers of agricultural implements and vehicles in the province of Nova Scotia, 1910.

TABLE 13.

TIMBER USED BY AGRICULTURAL IMPLEMENT AND VEHICLE MANUFACTURERS, 1910, IN PROVINCE OF NOVA SCOTIA: ORIGIN AND SPECIES: Total Quantity, Total Cost, Per Cent Distribution and Average Cost per M. B. F.

Species.	TOTAL QUANTITY USED. (Canadian and Imported.)			CANADIAN TIMBER			
	Quantity.	Cost.	Per Cent Distri- bution.	Quantity.	Cost.	Average cost per M.	Per Cent of Total.
	M ft. B.M.	\$		M ft. B.M.	\$	\$ cts.	
Total..	394	10,640	100	355	9,140	25 75	90.1
Birch...	110	1,940	28.1	110	1,940	17 64	100
Spruce...	87	1,660	22.0	87	1,660	19 08	100
Basswood...	75	3,000	19.1	75	3,000	40 00	100
Maple...	40	1,200	10.2	40	1,200	30 00	100
Hickory...	35	1,200	9.0				
Oak...	15	450	3.9	15	450	30 00	100
Ash...	12	570	3.5	12	570	47 50	100
Elm...	10	200	2.6	10	200	20 00	100
Tulip...	4	300	1.0				
Aspen Poplar	3	60	0.8	3	60	20 00	100
Pine*	3	60	0.8	3	60	20 00	100
IMPORTED TIMBER							
Total.				39	1,500	38 46	9.9
Birch							
Spruce							
Basswood.							
Maple...							
Hickory ..							
Oak....				35	1,200	34 28	100
Ash ...							
Elm....							
Tulip....							
Aspen Poplar				4	300	75 00	100
Pine* ..							

*Includes white and red pine.

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The implement and vehicle industries of the Maritime Provinces are small and have to compete even in the local market with the large manufacturers of Ontario. Less than 400,000 feet of timber were used in Nova Scotia in 1910. Native woods chiefly are used, hickory and tulip only being imported. Eleven species are used; birch, spruce, basswood and maple constitute four fifths of the supply. The timber used in Nova Scotia was not, on the average, of so high a grade as that used in Ontario and cost much less; the average cost in Nova Scotia is \$27.01; in Ontario it is \$32.46.

In table 14 are given the particulars of the various species of wood used in the vehicle and agricultural implement manufacturing industry of New Brunswick in 1910.

TABLE 14.

TIMBER USED BY AGRICULTURAL IMPLEMENT AND VEHICLE MANUFACTURERS, 1910, IN PROVINCE OF NEW BRUNSWICK, BY ORIGIN AND SPECIES: Total Quantity, Total Cost, Per Cent Distribution and Average Cost per M B.F.

Species.	TOTAL QUANTITY USED. (Canadian and Imported.)			CANADIAN TIMBER			
	Quantity	Cost.	Per Cent Distri- bution.	Quantity	Cost	Average cost per M.	Per Cent of Total.
	M ft. B.M.	\$		M ft. B.M.	\$	\$ cts.	
Total†.	191	4,134	100	184	3,769	20 48	96.3
Birch.	30	596	27.3	30	596	19 87	100
Spruce	24	355	21.9	24	355	14 80	100
Ash....	14	469	12.7	14	469	32 71	100
Basswood.	12	260	10.9	12	260	21 67	100
Beech....	9	134	8.2	9	134	14 88	100
Tulip...	7	365	6.4				
Oak.....	6	180	5.5	6	180	30 00	100
Pine* ..	5	100	4.5	5	100	20 00	100
Maple .	4	75	3.6	4	75	18 75	100

IMPORTED TIMBER.

Total (†)....	7	365	52 14	3.7
Birch				
Spruce				
Ash..				
Basswood.				
Beech				
Tulip...				
Oak..	7	365	52 14	100
Pine* ..				
Maple				

*Includes white and red pine.

†Includes a small amount not identified by species

Less than 200,000 feet of timber were used in New Brunswick, and excepting 7,000 feet of tulip all the wood used was native-grown.

Nine species only were used in New Brunswick; birch and spruce constitute about one-half the total. Maple, which was one of the most important woods in every other province, was least important in New Brunswick.

The average price paid for timber in New Brunswick was \$21.64, compared with \$32.46 in Ontario and \$27.01 in Nova Scotia.

The woods native to New Brunswick are suitable for implement manufacturing. They are both cheap and plentiful and there should be a further development of the implement industry in this province.

Table 15 gives comparative figures for the timber used in vehicle and agricultural implement building in Prince Edward Island in 1910.

TABLE 15.

TIMBER USED BY AGRICULTURAL IMPLEMENT AND VEHICLE MANUFACTURERS, 1910, IN PROVINCE OF PRINCE EDWARD ISLAND, BY ORIGIN AND SPECIES: Total Quantity, Total Cost, Per Cent Distribution and Average Cost per M B.F.

Species.	TOTAL QUANTITY USED. (Canadian and Imported.)			CANADIAN TIMBER.			
	Quantity.	Cost.	Per. Cent Distri- bution.	Quantity.	Cost.	Average cost per M.	Per Cent of Total.
	M ft. B.M.	\$		M ft. B.M.	\$	\$ cts.	
Total*	94	1,529	100	92	1,360	14 78	97.9
Birch.....	56	767	72.0	56	767	13 70	100
Spruce.....	16	263	20.3	16	263	16 44	100
Beech.....	3	71	3.8	3	71	23 66	100
Tulip.....	1	110	1.3				
Basswood.....	1	59	1.3				
Aspen Poplar.....	1	49	1.3	1	49	49 00	100

IMPORTED TIMBER.				
Total*.....	2	169	84 50	2.1
Birch.....				
Spruce.....				
Beech.....				
Tulip.....	1	110	110 00	100
Basswood.....	1	59	59 00	100
Aspen Poplar..				

*Includes a small amount not identified by species.

The factories on Prince Edward Island are small and cater to the local trade. Less than 100,000 feet of timber were used in Prince Edward Island, a larger proportion of which (97.1 per cent) was Canadian wood than in any other province.

Six species were used; about three-quarters of the total was birch; one-fifth was spruce; the other woods were beech, tulip, basswood and poplar. Tulip is the only imported wood reported by every province in Canada. The average cost of the timber used in Prince Edward Island was less than in any other province, \$16.27.

Table 16 gives for purposes of comparison a statement of the average prices received at the sawmills of Canada for the mill-run of each species used in the furniture and car, and agricultural implement and vehicle industries, together with the average cost of each species to these industries.

TABLE 16.

COMPARISON OF LUMBER PRICES AT SAWMILL AND AT FACTORY: Average prices paid for Native Lumber at the Sawmill, compared with those paid by furniture and car manufacturers and agricultural implement and vehicle manufacturers at their factories, 1910.

Kind of Wood.	Value of Lumber at sawmills per M feet B.M.	Cost of Furni- ture and Car Industries		Cost to Imple- ment and Vehi- cle Industries
		per M	ft. B. M.	per M ft. B. M.
Average of all species.....	\$15 81	\$20 82		\$24 64
Ash.....	18 78	23 16		24 45
Balsam.....	13 07			14 39
Basswood.....	18 34	23 07		23 90
Beech.....	12 47	18 84		16 33
Birch.....	17 19	19 21		20 97
Butternut.....	19 03	17 00		16 00
Cedar.....	15 37			19 11
Cherry.....	26 75			104 00
Chestnut.....	21 84			21 66
Cottonwood.....	16 00			39 19
Douglas fir.....	15 45	27 48		37 90
Elm.....	17 97	22 89		22 77
Hemlock.....	12 45	12 40		18 47
Hickory.....	39 61			35 85
Larch (tamarack).....	15 21	13 50		17 60
Maple.....	17 35	21 64		26 72
Oak.....	29 72	69 10		37 74
Pine (white).....	20 41	20 38		24 00
Poplar.....	14 71	12 50		29 94
Spruce.....	13 55	17 28		17 14
Tulip.....	30 00			67 35
Walnut.....	39 26	71 00		

The average mill-run price, \$15.81, is much lower because it includes all grades, and because it is the price of the lumber at the point of production. The average cost to the furniture or car manufacturer, \$20.82, is about 30 per cent higher, not only because only the better grades of lumber are used, but also because shipping charges have been paid, and because imported lumber is used which is of a higher quality and commands a higher price than Canadian lumber. The average cost to the implement and vehicle manufacturers is about 66 per cent higher than the mill-run price in Canada and is about 25 per cent higher than the cost to furniture and car manufacturers.

That the vehicle and implement manufacturers pay, on the average, nearly \$9 per thousand more than the Canadian mill-run price for the timber they use, and nearly \$4 more than the cost to the furniture and car manufacturers is due to the necessity of using perfect lumber, the very best grade obtainable in all species. The hardwoods of Canada, with two or three exceptions, do not supply a large proportion of high-grade lumber, and the fact that the high grades must be imported from the United States adds materially to the cost.

A study of the prices given for each species in table 16 may enable lumber producers to inquire if they can sell and purchasers to inquire if they can buy to better advantage. The Forestry Branch is in a position to furnish those interested with the names of the manufacturers cutting each species of timber and with the names of the great users of each different species.

Future Supplies of Timber for Manufacturing.

It has been shown throughout the preceding tables and discussion that Canadian manufacturers are now using inferior woods, or are importing their timber at a high cost, which places them at such a disadvantage that it is with difficulty that they compete with United States manufacturers of furniture, vehicle-parts and hardwood goods. The timber imported is coming from a comparatively small area of virgin forest in the Mississippi valley and Appalachian mountain region of the United States, subject to the demand of the whole United States, where it is estimated that at the present rate of cutting the supply of valuable hardwoods will last only a few years. As the supply of hardwoods is reduced in the United States, the grades used by the Canadian manufacturers must be lowered and the price greatly increased, unless steps are taken to produce in Canada the hardwoods used for manufacturing purposes.

The United States and Canada are at present practically the only important countries depending altogether upon the natural forest for their supplies of high-grade timber for industrial purposes. Even in the United States manufacturers and other large users are now preparing to produce their own timber supplies. The United States Forest Service reports that over forty users of timber have during the past few years adopted the policy of managing privately owned lands with the intention of growing timber for their requirements.

Canada is yearly growing more dependent upon foreign countries for her supplies of the grades of timber used by manufacturers. If Canadian manufacturers are to be assured of a perpetual supply of timber, if Canada is to keep pace with the other nations in the wise use of land, private individuals, corporations and governments must all undertake the planting and management of waste land for the production of valuable timber.

Trees which produce a profit above all costs of production and management and which would succeed on land now lying idle in the manufacturing districts of Canada are white pine, oak, basswood, elm, ash, hickory and tulip.

The implement manufacturers of Manitoba paid in 1910 about \$67 per thousand feet for oak which they imported from the United States. White oak is native to Manitoba and reaches large sizes in the Turtle Mountain Forest Reserve. This reserve has been cut over and burned over, but it is now being put under scientific management. When properly stocked this reserve will produce 6,000,000 feet of white oak timber per year. The local production of this timber will be of great assistance to the industries of Manitoba. This is an instance of what can be done by the proper management of waste lands.

The Forestry Branch will furnish free advice to manufacturers or others who are interested in investigating the question of planting or managing woodlands for the production of timber.

VENEER.

This report is based upon information secured from 98 manufacturers and users of veneer in Canada. Seventy-five of these are located in Ontario, 20 in Quebec and 3 in Nova Scotia.

The manufacturers of veneer belong chiefly to two classes. The most important are those situated in the hardwood belt who manufacture birch and maple veneer, part of which is used in Canada and part of which is exported. The other class of veneer manufacturers are located in the fruit and dairying districts, and manufacture chiefly elm and basswood veneer, practically all of which is used in Canada for fruit or dairy packages. As a rule this latter class of veneer manufacturers operate smaller plants than the class first mentioned.

Excepting the manufacturers of produce packages, the chief users of veneer in Canada, who are the furniture, musical instrument, panel, box and car manufacturers, buy their veneer already manufactured.

Reports were also secured from these manufacturers, showing the quantities of imported veneer used by them. The reported amount of imported veneer is only about 50 per cent of the amount which passed through the hands of the Customs.

Table 17 shows by species the amount of veneer manufactured or used in Canada in 1910, giving the percentage manufactured in Canada and the percentage imported from other countries.

TABLE 17.

VENEER MANUFACTURED OR USED IN CANADA BY SPECIES, 1910: Total Quantity, with Proportion Manufactured in Canada and That Imported.

Species.	Total Manufactured or Used in Canada. (M square feet)	Per Cent Manufactured in Canada.	Per Cent Imported.
Total...	92,066	90.9	9.1
Birch...	24,580	98.6	1.4
Maple...	18,663	99.4	0.6
Elm...	15,253	100.0	0.0
Basswood...	9,420	100.0	0.0
Pine...	5,368	100.0	0.0
Spruce...	3,440	100.0	0.0
Oak...	3,113	9.1	90.9
Ash...	2,462	99.8	0.2
Balsam Fir...	2,000	100.0	0.0
Hemlock...	2,000	100.0	0.0
Tulip...	1,738	0.2	99.8
Mahogany...	1,428	0.0	100.0
Spanish Cedar...	1,088	0.0	100.0
Beech...	953	100.0	0.0
Gum...	308	0.0	100.0
Circassian Walnut...	101	0.0	100.0
Black Walnut...	85	0.0	100.0
Sycamore...	60	100.0	0.0
Alder...	5	100.0	0.0
Poplar...	1	100.0	0.0

Including native and imported veneer, 92,066,000 square feet of veneer were produced or used in Canada in 1910, varying in thickness from $\frac{1}{400}$ to $\frac{3}{4}$ of an inch. This amount was made up of twenty species, which may be divided by their use and origin into four classes.

Birch and maple were used mostly as thick veneers $\frac{1}{4}$ to $\frac{3}{4}$ of an inch in thickness. These two species were used for chair seats and other parts of furniture, panel and interior work, and interior finish for cars and coaches. Along with tulip they were used for the bent work in vehicle bodies and seats.

Elm, basswood, ash, beech and gum were cut thin, mostly $\frac{1}{16}$ to $\frac{1}{8}$ of an inch, and were used for fruit baskets, boxes and packages. Cut in heavier thicknesses, these woods are used in reinforcing crates and other shipping packages and in the manufacture of 'built-up' lumber.

Pine, spruce, balsam fir, hemlock and gum were thick and used as 'cores' or for sections of fine veneer in the manufacture of furniture.

Fine-grained yellow birch, curly and bird's-eye maple, oak, mahogany, Spanish cedar, Circassian walnut, black walnut and sycamore were cut very thin and used in the finishing of high-class furniture, office fittings, electric cars, first-class railway coaches, sleeping and dining cars.

Birch was produced or used for veneer to the extent of 24,580,000 square feet, and formed 28 per cent of the total amount. Maple stands second, furnishing 20 per cent of the total. Because of the beautiful grain, rich colour and fine surface required in woods used in the finishing of furniture, birch and maple are the only two native species that can be used for this purpose. They are the cheapest and least valuable of furniture woods. All the more expensive are imported. These two species, along with elm, form over 60 per cent of the total consumption. About four-fifths of the veneer used is manufactured in Canada. This percentage is made up of all woods except mahogany, Spanish cedar, gum, tulip, Circassian walnut and black walnut. Nine tenths of the oak used has to be imported, owing to the inferior quality and small quantity of the species in Canada. The above named imported woods constitute 9.1 per cent of the total amount.

Practically all the veneer manufactured in Canada is rotary-cut. This method does not produce as fine a surface as slicing or sawing, but it is quite satisfactory for the thick veneer made from the native woods. Nearly all the veneer imported into Canada, which, as noted, was valuable finishing wood for furniture, has been either sliced or sawn. This is especially the case with mahogany, Spanish cedar, Circassian walnut, and black walnut, most of which are valued according to the grain exhibited and are, therefore, cut from fine-grained logs or burls in such a manner as to secure the prettiest cross sections.

Table 18 gives details of the veneer manufactured in Canada.

TABLE 18.

VENEER MANUFACTURED IN CANADA, 1910: Total Quantity, Total Value, Average Value per M B.F., and Per Cent Distribution by Species.

Species.	Per Cent Distribution.	Quantity	Value.	Average value per M.
		M square ft.	\$	\$ cts.
Total.....	100.0	84,020	627,995	7 47
Birch.....	28.8	24,228	267,331	11 08
Maple.....	22.1	18,558	99,137	5 47
Elm.....	18.2	15,253	51,735	3 40
Basswood.....	11.2	9,420	61,058	6 41
Pine.....	6.4	5,368	13,627	2 54
Spruce.....	4.1	3,440	32,460	9 44
Ash.....	2.9	2,455	32,734	13 37
Balsam Fir.....	2.4	2,000	30,000	15 00
Hemlock.....	2.4	2,000	30,000	15 00
Beech.....	1.1	953	8,790	9 22
Oak.....	0.3	282	728	2 58
Sycamore.....	0.1	60	240	4 00
Tulip.....	*	4	150	37 50
Poplar.....	*	1	5	5 00

* Less than one tenth of one per cent.

The total amount was 84,020,000 square feet valued at \$627,995 or \$7.47 per thousand square feet. This is made up of fourteen species. Owing to the native woods forming such a large percentage of the total consumption the order of importance of the first six species (birch, maple, elm, basswood, pine and spruce) is the same in table 18 as in table 17. These species made up 90.8 per cent of the total manufactured in Canada.

Ash, balsam fir and hemlock were used in about equal quantities, and together formed 7.7 per cent of the total native veneer.

The remaining species (beech, oak, sycamore, tulip and alder) were used in negligible quantities.

To understand the relative average value per thousand feet of these woods, the thickness in which the various species are cut must be considered as well as the quality of the wood.

Tulip was the most expensive wood, costing \$37.50 per thousand square feet for $\frac{1}{2}$ -inch stock.

Balsam fir and hemlock were two species which cost about \$15 per thousand square feet. As has been noted, these species are cut thick for cores and 'built-up,' or laminated, lumber.

Spruce and pine, costing \$9.44 and \$2.54 per thousand square feet respectively, were also used for this purpose.

Birch cost \$11.08 per thousand square feet, as compared with \$5.47 per thousand square feet for maple. Although maple is naturally the most expensive, this variation is due to the fact that much of this birch was the heartwood of yellow birch and was used stained as an imitation for cherry and mahogany.

Other native species cost from \$2.58 for thin veneer oak to \$3.37 for ash.

Table 19 shows the kinds and quantities of veneer imported into Canada.

TABLE 19.

VENEER IMPORTED INTO CANADA, 1910: Total Quantity, Total Value, Average Value per M B.F., and Per Cent Distribution by Species.

Species.	Per cent Distribution.	Quantity.	Value.	Average Value.
Total	100.0	M sq. feet. 8,046	\$ 140,687	\$ cts. 17 48
Oak.....	35.3	2,831	51,506	18 19
Tulip.....	21.6	1,734	22,606	13 03
Mahogany.....	17.8	1,428	30,571	21 41
Spanish Cedar.....	13.6	1,088	20,000	18 38
Birch.....	4.4	354	2,915	8 24
Gum.....	3.8	308	2,123	6 90
Maple.....	1.3	105	2,134	23 24
Circassian Walnut.....	1.2	101	6,443	63 80
Black Walnut.....	1.0	85	2,375	24 41
Ash.....	*	7	114	16 29
Alder.....	*	5	200	40 00

* Less than one tenth of one per cent.

8,046,000 square feet were imported, worth \$140,687. This is an average of \$17.48 per thousand square feet or \$10.01 more per thousand than Canadian wood cost. Oak constituted 35.3 per cent of the importations and cost \$18.19 per thousand square feet. Canadian oak cost \$2.58 and the difference of \$15.61 is largely due to difference in quality. This oak was used as a thin veneer for medium-priced furniture.

Tulip, forming 21.6 per cent of the total imports, was used to the extent of 1,734,000 square feet. It cost, on the average, \$13.03 per thousand square feet, and is used in furniture, bases for cigar boxes, bent work in vehicles, and in panels and hoods of automobiles.

Mahogany is the third species in importance, forming 17.8 per cent of the total. 1,428,000 square feet were imported and cost \$21.41 per thousand square feet. This mahogany is sawn very thin and used as a stained veneer for high-class furniture and first-class railway cars. Mahogany comes, through England and the United States, chiefly from Africa and Central America.

1,088,000 feet of Spanish cedar were imported and cost \$18.38 per thousand square feet. This species is for cigar boxes chiefly, and is veneered on a tulip, bass-wood, soft elm or gum base. It comes from the West Indies by way of the United States.

The above four species made up 88.3 per cent of the total imports.

Birch, maple and gum were used in fairly small quantities. Gum is used as a 'core' for panel work, furniture and veneer boxes and a little for fruit packages.

Circassian walnut was the most expensive wood imported. 101,000 feet were used at a cost of \$63.80 per thousand square feet. It is used for expensive furniture. This is all imported from south-eastern Europe by way of England or the United States.

85,000 feet of black walnut were imported at a cost of \$24.41 per thousand square feet. This is still a popular furniture wood in the United States as 2,400,000 feet (log scale) were used in 1909. Compared with this, very little was imported into Canada. These importations were used entirely for furniture, as was the Circassian walnut, but the latter was more beautiful and expensive.

Excepting the three species—mahogany, Spanish cedar and Circassian walnut—all the imported woods are native to the United States.

Oak, mahogany, maple and black walnut, used for furniture, cost from \$18.19 to \$24.41 per thousand square feet.

The other imported species varied from \$6.90 to \$16.29 per thousand square feet, and were used chiefly for fruit packages or as a 'core' for 'built-up' work.

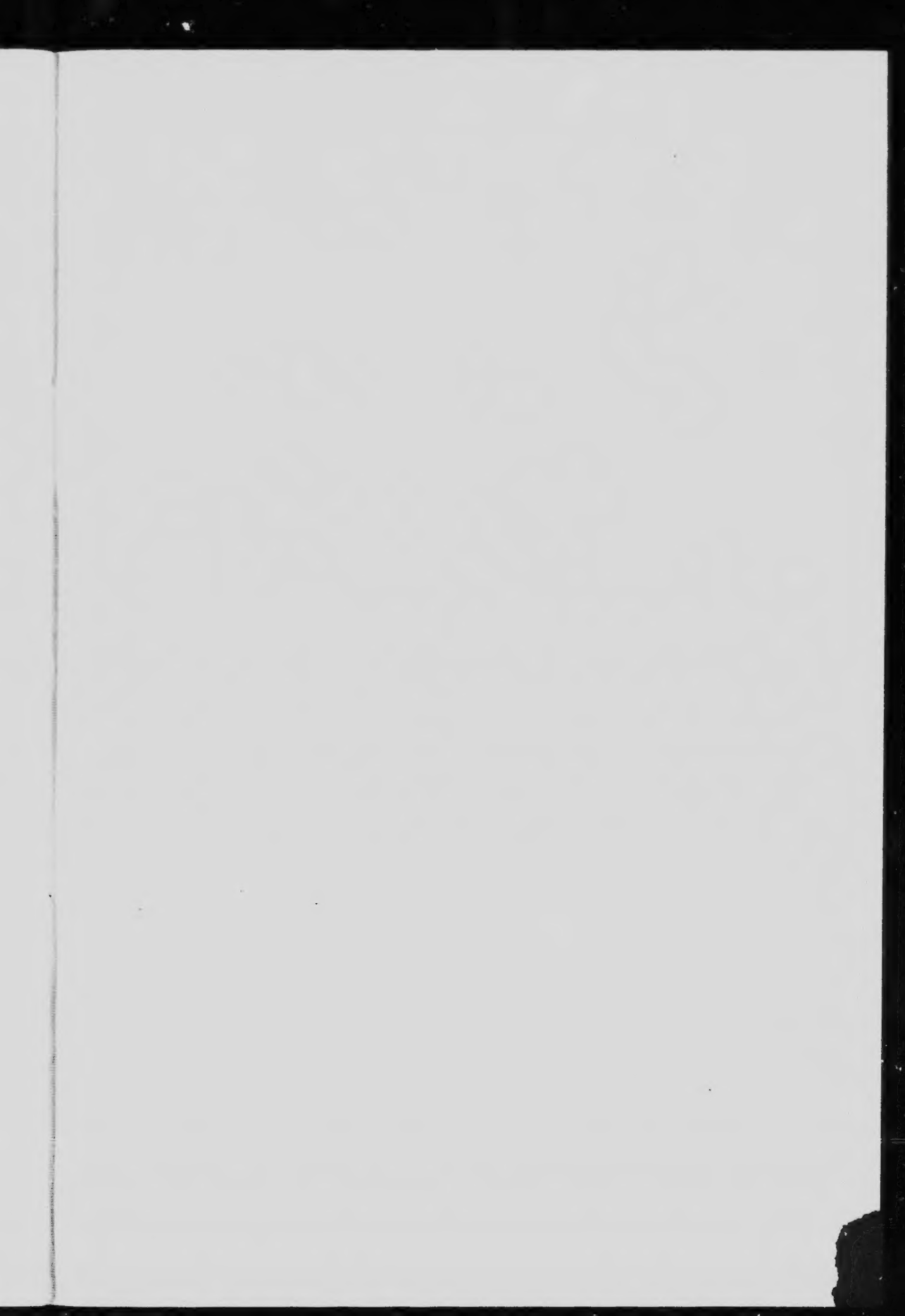
Exports of veneer to the United States in 1909 amounted to \$28,900. This was made up of three species—maple, birch and beech—in the following amounts: \$15,400 worth of maple, \$7,500 worth of birch, and \$6,000 worth of beech.

The industry of veneer manufacture is developing most rapidly. There are now practically no beautiful furniture woods native to Canada and imported woods are expensive. Consequently few people can afford to buy such woods as solid mahogany or walnut for furniture or other articles. As a result the practice has grown of 'building up' with a cheap species and covering with a thin veneer of a more expensive and beautiful wood certain articles demanding strength and beauty of finish, such as doors, furniture, interior finish and panels. The use of veneer in this manner has made it possible to save the expensive woods and to cover from fifty to one hundred times as great a surface with a fine-grained log as would be possible if lumber were used instead of veneer.

Where panels were formerly manufactured solid they are now manufactured of two or more thicknesses of veneer glued together with the grain in each thickness extending in a different direction, so that splitting or warping is prevented. This method of manufacture is making possible the use of woods of low quality in situations where they could not otherwise be used.

The lumber used for fruit baskets, cheese boxes and other packages is now manufactured in the form of veneer. The material in this way is turned out in sheets from which the product may be cheaply manufactured and there is an almost complete utilization of the lumber which would not be possible under any other means of manufacture.

The diminishing supply of beautiful finishing woods will constantly tend to make the use of veneers more general.





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